Advanced Reading Questions: Thin Lens Lab

1. A camera is essentially a device that uses a convex lens to project a real image of an object onto a sheet of film (i.e., the image of the lens system is formed on the film). For a 35 mm camera, the size of the active area of the film is 24 mm $\times$ 35 mm.

   (a) The camera is fitted with a telephoto lens of focal length 200 mm, and is used to make a photograph of an object which is 15 m away from the camera. What is the distance between the lens and the film in the camera? You may make the assumption that the telephoto lens is a "thin" lens. Use equation (1); the distance from the lens to the film is i.

   (b) What is the lateral magnification, m, of the lens system in this situation? (Hint: It's surprisingly small!)

   (c) What is the maximum size of the object which may be photographed if the image is to just fit on the film when the object is 15 m from the camera? (Hint: It's much bigger than 35 mm.)